TMDL Development for the Smith River and Dan River Basins

Final Public Meeting

Martinsville, VA

March 27, 2008

THE Louis Berger Group, INC.

DEQ
Virginia Department of Environmental Quality

Why Are We Here?

- Learn about water quality in the Smith River, Marrowbone Creek, Leatherwood Creek, South Mayo River and North Mayo River
- Explain efforts that the State is undertaking to improve and protect water quality
- Present draft TMDL report for bacteria

Water Quality Monitoring Program

- Capture ambient conditions in streams & lakes
- Samples are collected from bridges or other public access points

Water Quality in the Smith River, tributaries, North and South Mayo Rivers

- **Water Quality Problems exist on several streams and rivers in Henry, Patrick, and Franklin Counties**
  - 2 Main problems:
    - Water Data found elevated levels of **Bacteria**: Smith River, Marrowbone Creek, Leatherwood Creek, Blackberry Creek, North and South Mayo Rivers → *Focus of Tonight's meeting*
    - Biomonitoring data showed that water quality does not support a healthy Aquatic Insect community – Cause to be determined → *Next meeting TBD*

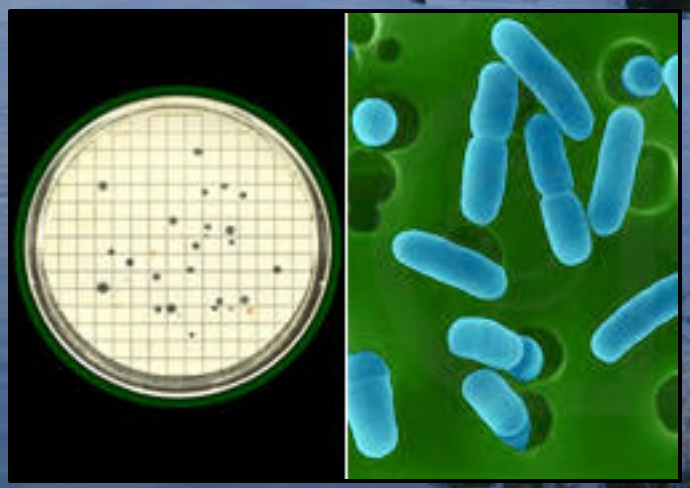
Bacteria Impairments

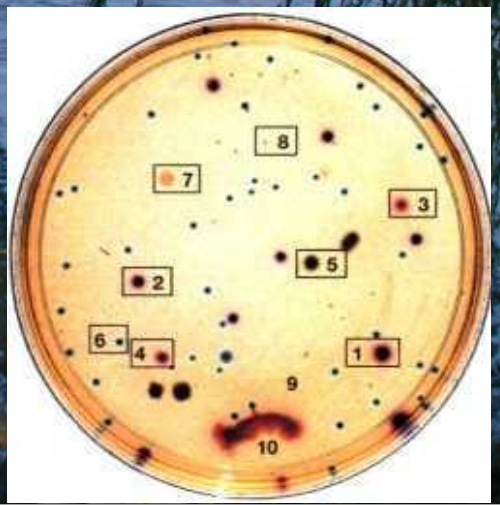
What does impaired mean?

- More than 10.5% of samples collected exceeded State standards for bacteria

What is the standard?

- No more than 235 E.Coli colonies per 100ml water (~1/2 cup)
- Bacteria (like E.Coli) are found in the intestines of warm-blooded animals





Why Are High Bacteria Levels Bad?

- Presence of E.Coli indicates that other disease causing bacteria may be present

Human Health Concern

- Chance of gastrointestinal illness or infection during primary contact (e.g., water in mouth, nose, eyes, open wounds)

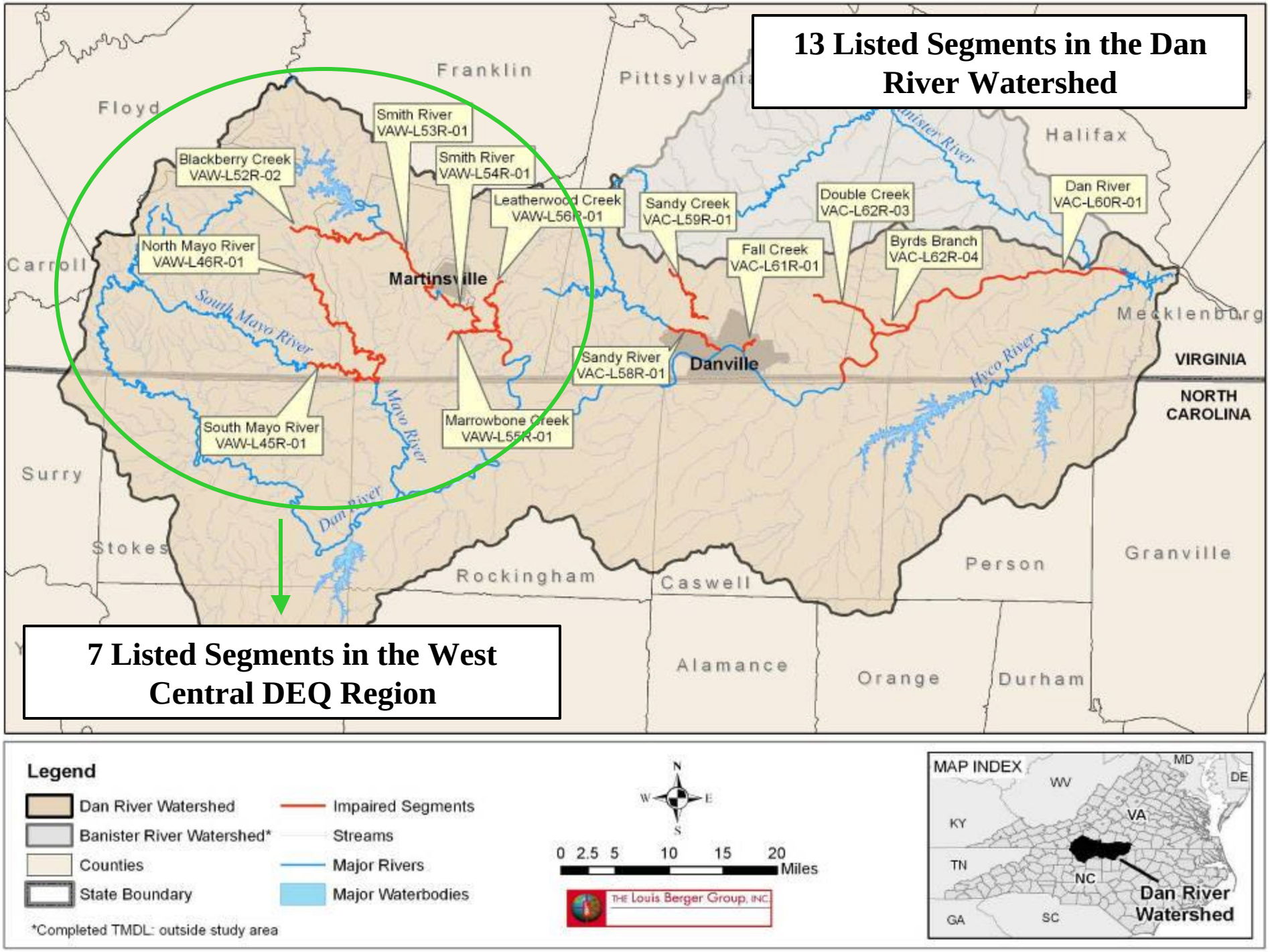
Other Concerns

- Livestock health and weight gain

Bacteria Levels

Stream Name	Miles	Impairment	Exceedence Rate**
Blackberry Creek	14.82	Bacteria	15%
	6.95	Bacteria	15%
Smith River	13.77	Bacteria	17% & 17%
South Mayo River	10.86	Bacteria	12.5%
Leatherwood Creek	8.34	Bacteria	13%
Marrowbone Creek	4.33	Bacteria	14%
North Mayo River	22.46	Bacteria	12% & 33%

** * Ratio of Total # of Violations to Total # of Measurements*


13 Listed Segments in the Dan River Watershed
Franklin
Pittsylvania
Halifax
Floyd
Carroll
Surry
Stokes
Rockingham
Caswell
Person
Granville
Alamance
Orange
Durham
Mecklenburg
VIRGINIA
NORTH CAROLINA
Smith River VAW-L53R-01
Smith River VAW-L54R-01
Blackberry Creek VAW-L52R-02
Leatherwood Creek VAW-L56R-01
North Mayo River VAW-L46R-01
Martinsville
South Mayo River
Mayo River
Dan River
Marrowbone Creek VAW-L55R-01
South Mayo River VAW-L45R-01
Sandy River VAC-L58R-01
Danville
Sandy Creek VAC-L59R-01
Fall Creek VAC-L61R-01
Double Creek VAC-L62R-03
Byrds Branch VAC-L62R-04
Dan River VAC-L60R-01
Banister River
Hyco River
7 Listed Segments in the West Central DEQ Region
Legend
Dan River Watershed
Banister River Watershed*
Counties
State Boundary
Impaired Segments
Streams
Major Rivers
Major Waterbodies
*Completed TMDL: outside study area
N
W
E
S
0 2.5 5 10 15 20
Miles
THE Louis Berger Group, INC.
MAP INDEX
MD
DE
WV
KY
VA
TN
NC
GA
SC
Dan River Watershed

How Do We Tackle These Water Quality Problems?

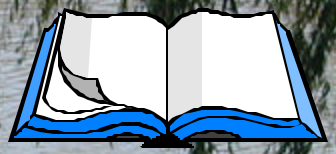
- **DEQ works with a Consultant – Louis Berger Group to develop a Total Maximum Daily Load (TMDL)**
- **Public Participation through Public Meetings**
- **DEQ's Lynchburg office is working concurrently to address bacteria problems in the Dan River**
- **2 Reports**
  - Bacteria TMDL Report for the entire Dan River watershed (including the Dan, the Smith & tributaries, South Mayo, and North Mayo)
  - Benthic TMDL Report for the Smith River watershed

What Happens When a Stream is Impaired?

The State begins a formal study to clean up that water body (a TMDL)

Total
Maximum
Daily
Load

We are here



Implementation Plan

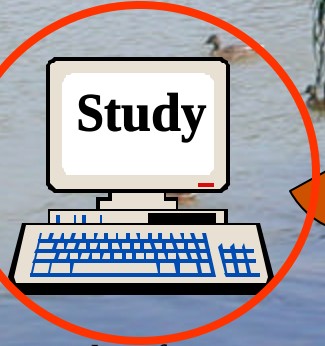
- Identifies permit controls or best management practices needed to make necessary pollutant reductions

Monitoring

Implementation

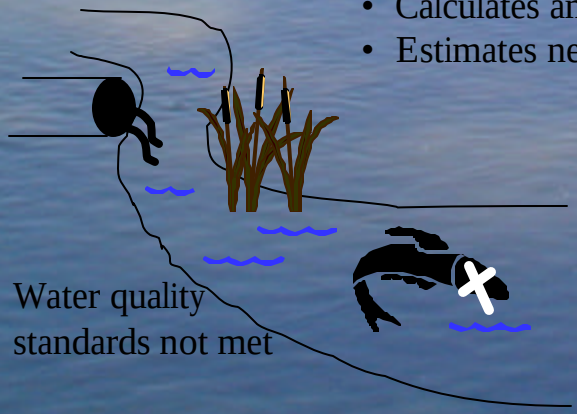
Clean

Water quality standards met



Polluted

- Identifies sources of pollution
- Calculates amounts from each source
- Estimates necessary pollutant reductions

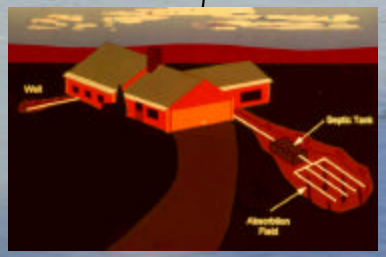


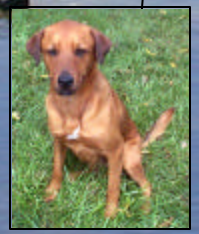
Water quality standards not met

The Process

What are the Study Goals?

- Identify all sources of fecal bacteria
- Quantify amounts from each source
- Estimate reductions necessary to meet water quality standards





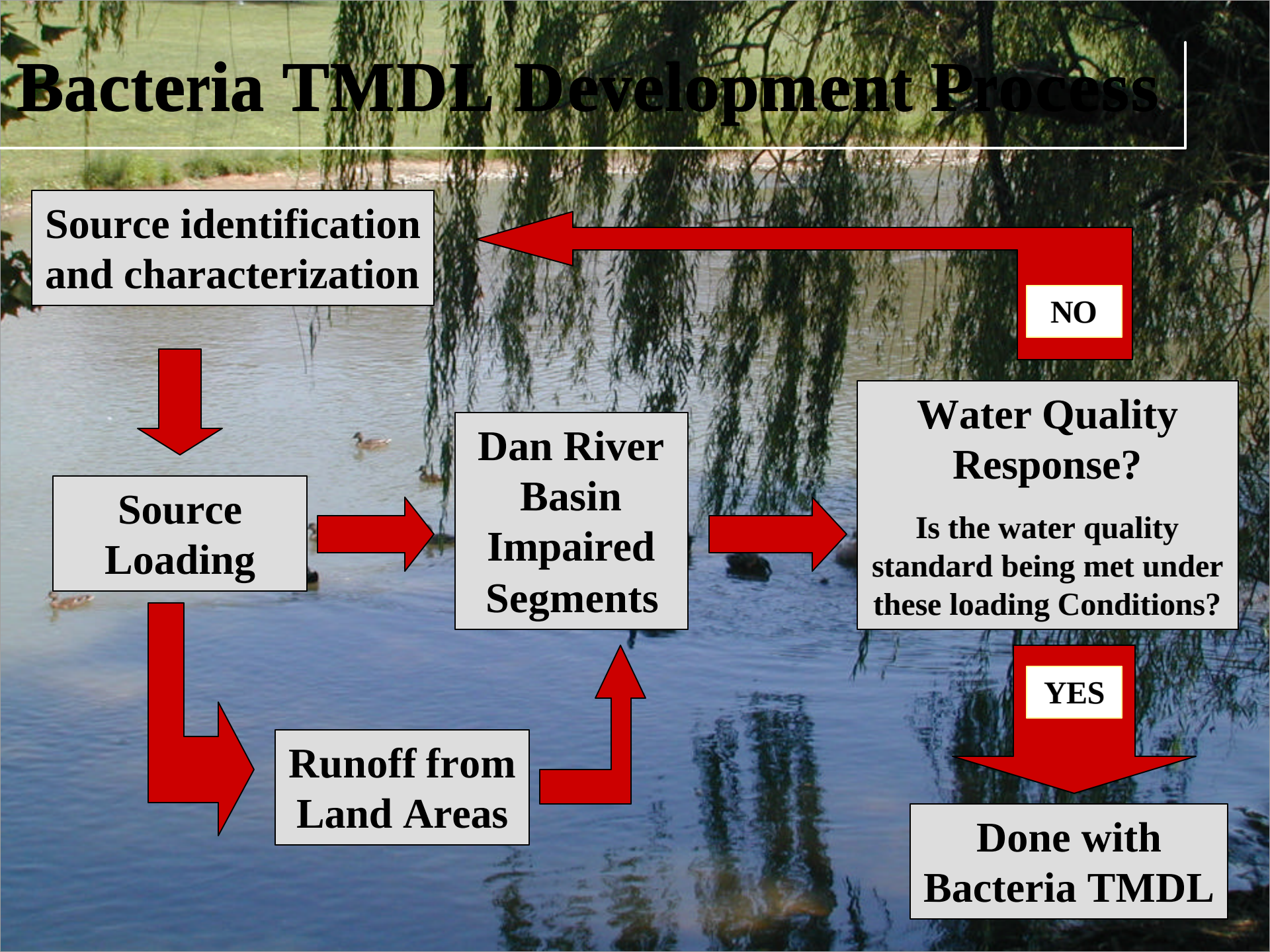
Final Reductions

Watershed	Human Sources (failed septic systems and straight pipes)	Livestock (Direct Instream Loading)	Agricultural and urban non point Sources	Wildlife (Direct Instream Loading)
Blackberry Creek VAW-L52R-02	100%	100%	92%	0%
Leatherwood Creek VAW-L56R-01	100%	100%	97%	24%
Marrowbone Creek VAW-L55R-01	100%	100%	95%	9%
North Fork Mayo River VAW-L46R-01	100%	100%	89%	0%
Smith River VAW-L53R-01	100%	100%	96%	64%
Smith River VAW-L54R-01	100%	100%	96%	64%
South Fork Mayo River VAW-L45R-01	100%	100%	97.9%	0%

What is a TMDL?

- **TMDL = TOTAL MAXIMUM DAILY LOAD**
- **TMDL = Amount of pollution a waterbody can handle without negatively impacting that waterbody.**
- **A TMDL considers all forms of pollution**
  - **point sources (from a specific location)**
  - **non-point sources (overland runoff with no defined source)**
  - **natural sources (wildlife)**

Bacteria TMDL Development Process



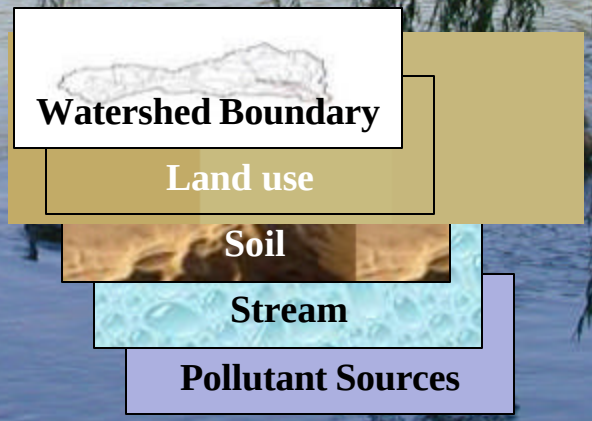
Water Quality Model: HSPF

Hydrologic Simulation Program Fortran

Input → **Model** → **Output**

Factors:

- Rainfall events
- Fecal coliform build up
- Fecal coliform wash off
- Fecal coliform die off rates

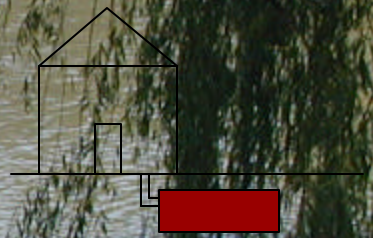


Dan River Response

Bacteria Sources Assessment

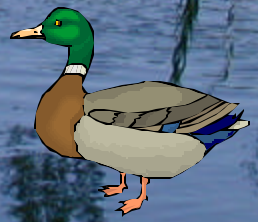
Addresses the following issues related to bacteria production:

- **Bacteria loading from Human Sources**
  - Straight pipes
  - Septic systems



- **Bacteria loading from Livestock**
  - Livestock inventory

- **Bacteria loading from Wildlife**
  - Wildlife Inventories



- **Bacteria loading from Pets**
  - Pet Inventories

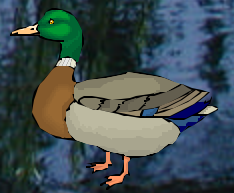
Livestock Source Estimates

Watershed	Livestock Type					
	Beef Cows	Milk Cows	Hogs and Pigs	Sheep and Lambs	Chickens	Horses
North Fork Mayo River	1,570	107	33	20	72	127
South Fork Mayo River	2,221	235	131	52	3,949	154
Smith River	6,848	662	128	73	564	709
Dan River Total	***38,529***	***3,605***	***10,373***	***1,278***	***268,597***	***6,987***

Livestock numbers are based on the 2002 US Agricultural Census data, the chicken numbers are based on permit information provided by VADEQ, and the horse numbers were based on the 2001 VA Agricultural Statistics Equine report.

Wildlife Source Estimates

Watershed	Wildlife Animal							
	Deer	Raccoon	Muskrat	Beaver	Goose	Mallard	Wood Duck	Wild Turkey
North Fork Mayo River	3,294	3,362	14,529	1,585	280	11	9	701
South Fork Mayo River	4,309	4,346	18,781	2,049	367	14	12	917
Smith River	16,325	16,796	72,585	7,918	1,390	53	47	3,473
Dan River Total	***84,171***	***84,553***	***365,400***	***39,862***	***7,165***	***266***	***239***	***17,908***



Estimates are based on NLCD 2001 land use data and distribution estimates from DGIF

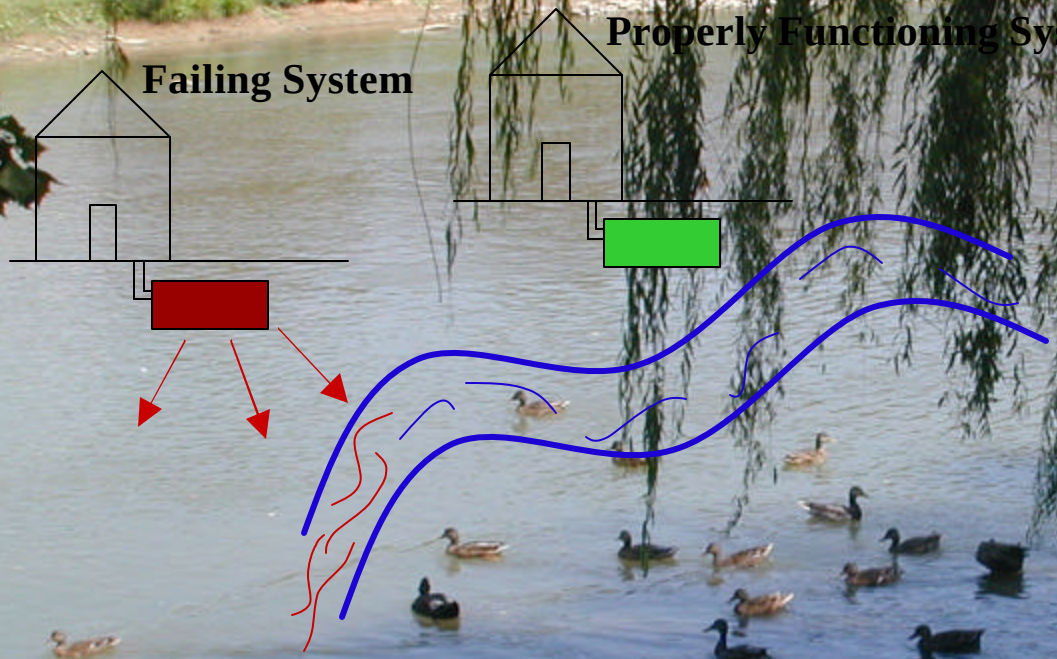
Pet Source Estimates

Pet estimates are based on U.S. Census Bureau data and national pet averages per household (American Veterinary Medical Association):

- 0.543 Dogs per household
- 0.593 Cats per household

Watershed	Cats	Dogs
North Fork Mayo River	2,519	2,306
South Fork Mayo River	1,722	1,577
Smith River	2,519	2,306
Dan River Total	***81,826***	***74,927***

Human Source Estimates



- Septic numbers are obtained from U.S. Census Bureau survey data.
- An estimated 3% of septic tanks are failing
- Within 200 ft of a stream, a failing septic system is likely to be discharging into the stream

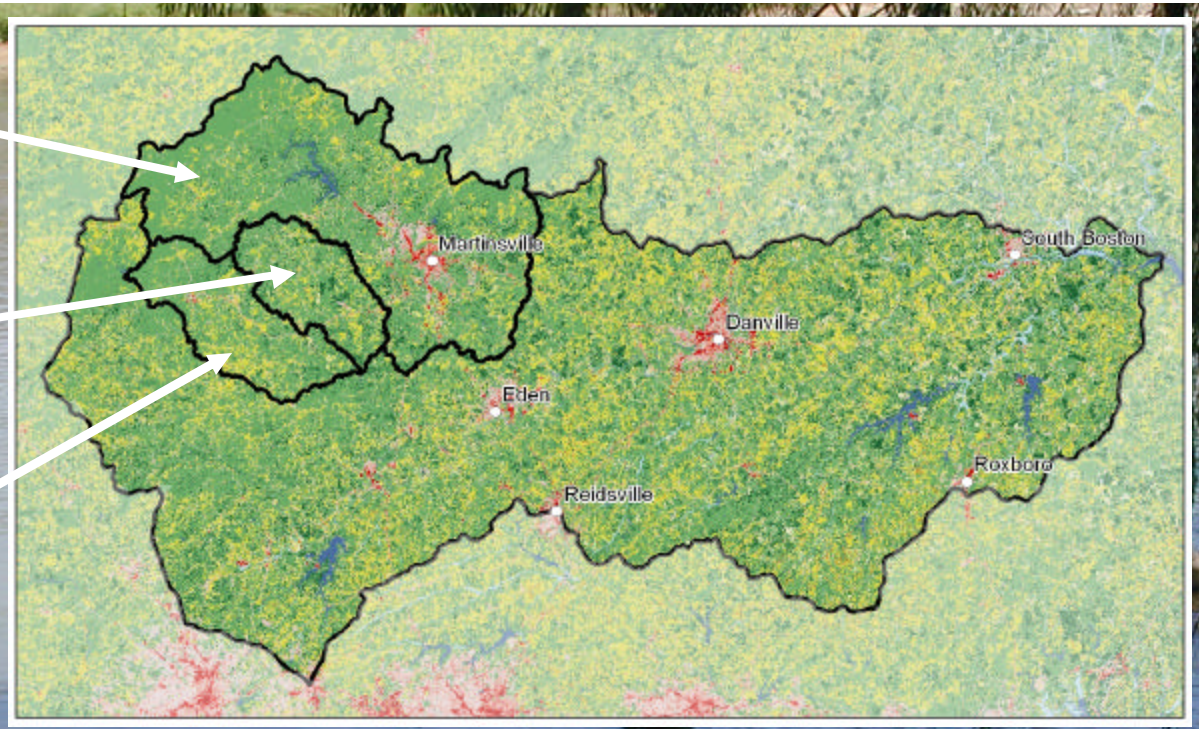
Watershed	Failing Septic Near Stream	Straight Pipes
North Fork Mayo River	6	12
South Fork Mayo River	7	3
Smith River	33	90
Dan River Total	***168***	***405***

Dan River Watershed Land Use

Smith River Watershed

North Fork Mayo River Watershed

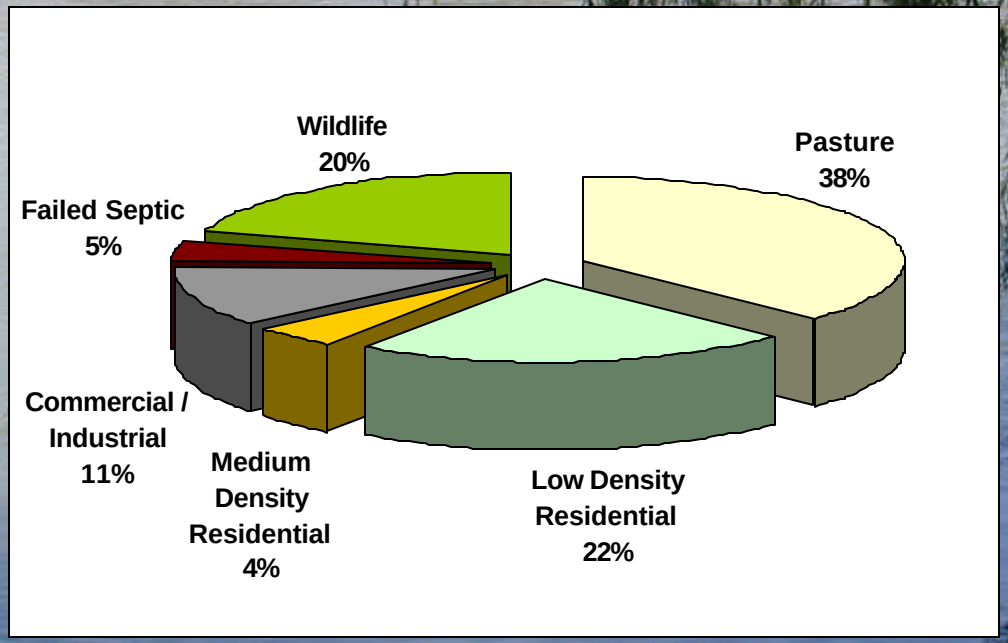
South Fork Mayo River Watershed



Watershed	Land Cover Type (%)				
	Water/ Wetlands	Developed	Agriculture	Forest	Total Acreage
North Fork Mayo River	<1%	4%	17%	78%	70,096
South Fork Mayo River	<1%	5%	21%	74%	91,690
Smith River	1%	8%	13%	77%	334,692
Dan River	2%	8%	23%	68%	1,790,978

Blackberry Creek (entire length)

Existing Load

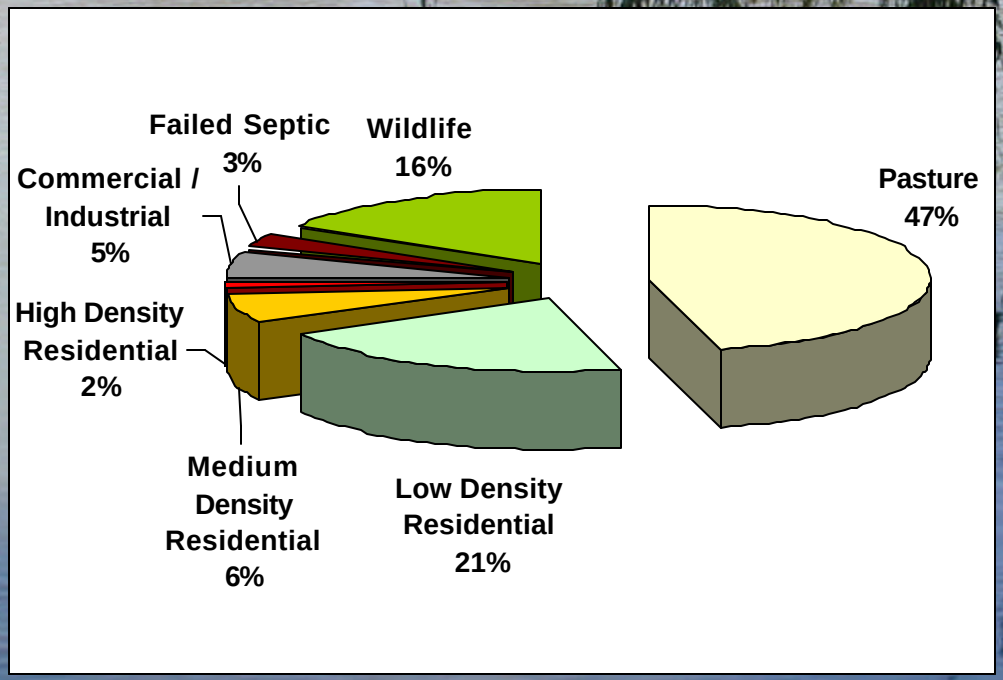


Bacteria Source	Percent Reduction
Forest	0%
Urban	92%
Agriculture	92%
Failed Septic	100%
Wildlife	0%
Cattle	100%
Point Source	0%

Leatherwood Creek

(Stoney Mtn. Rd. crossing to the mouth)

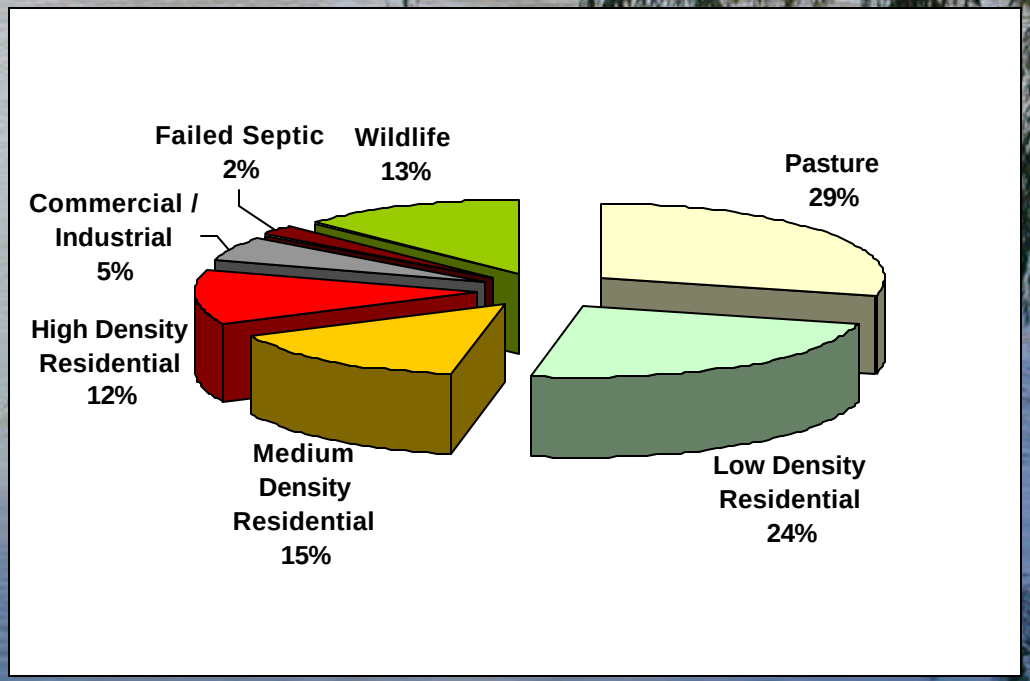
Existing Load



Bacteria Source	Percent Reduction
Forest	0%
Urban	97%
Agriculture	97%
Failed Septic	100%
Wildlife	24%
Cattle	100%
Point Source	0%

Marrowbone Creek
(WWTP to mouth on the Smith River)

Existing Load

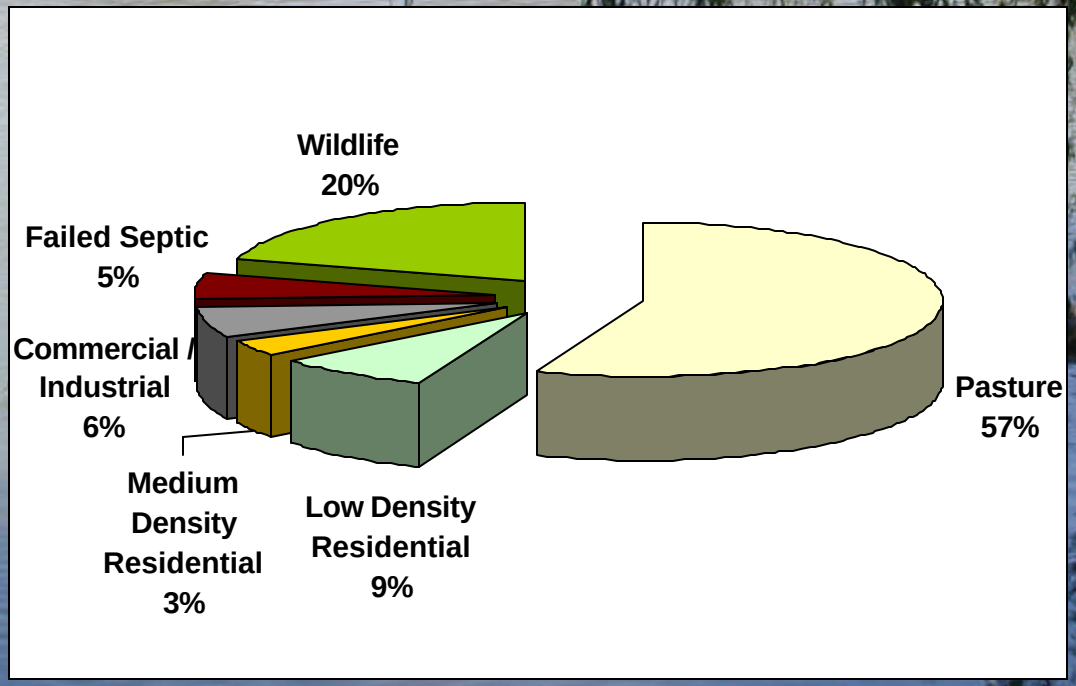


Bacteria Source	Percent Reduction
Forest	0%
Urban	95%
Agriculture	95%
Failed Septic	100%
Wildlife	9%
Cattle	100%
Point Source	0%

North Mayo River

(confluence of Laurel Br. & Poleridge Cr. to NC line)

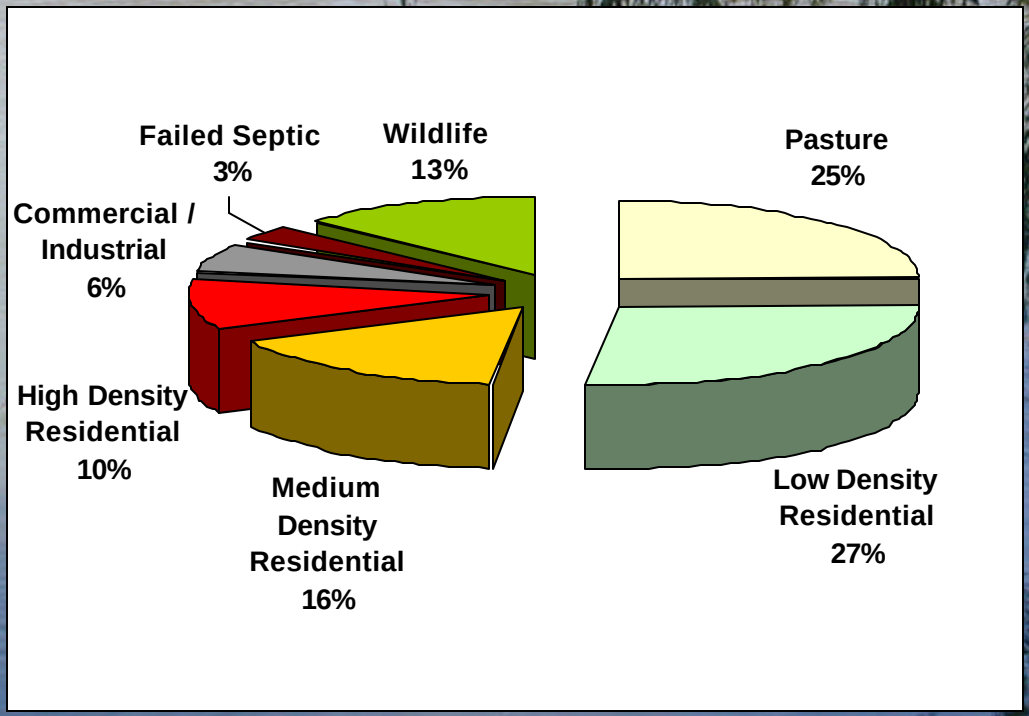
Existing Load



Bacteria Source	Percent Reduction
Forest	0%
Urban	89%
Agriculture	89%
Failed Septic	100%
Wildlife	0%
Cattle	100%
Point Source	0%

Smith River (L53R – Reed Cr. mouth to Martinsville dam)

Existing Load

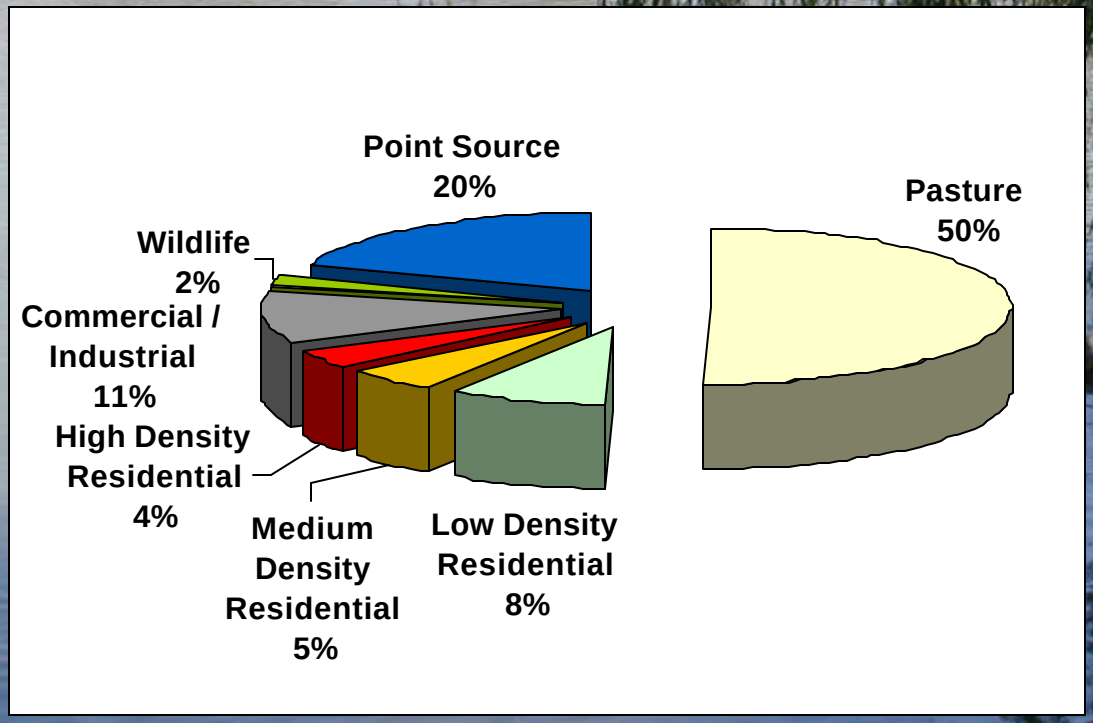


Bacteria Source	Percent Reduction
Forest	0%
Urban	96%
Agriculture	96%
Failed Septic	100%
Wildlife	64%
Cattle	100%
Point Source	0%

Smith River

(L54R – Martinsville dam to Turkey Pen Branch mouth)

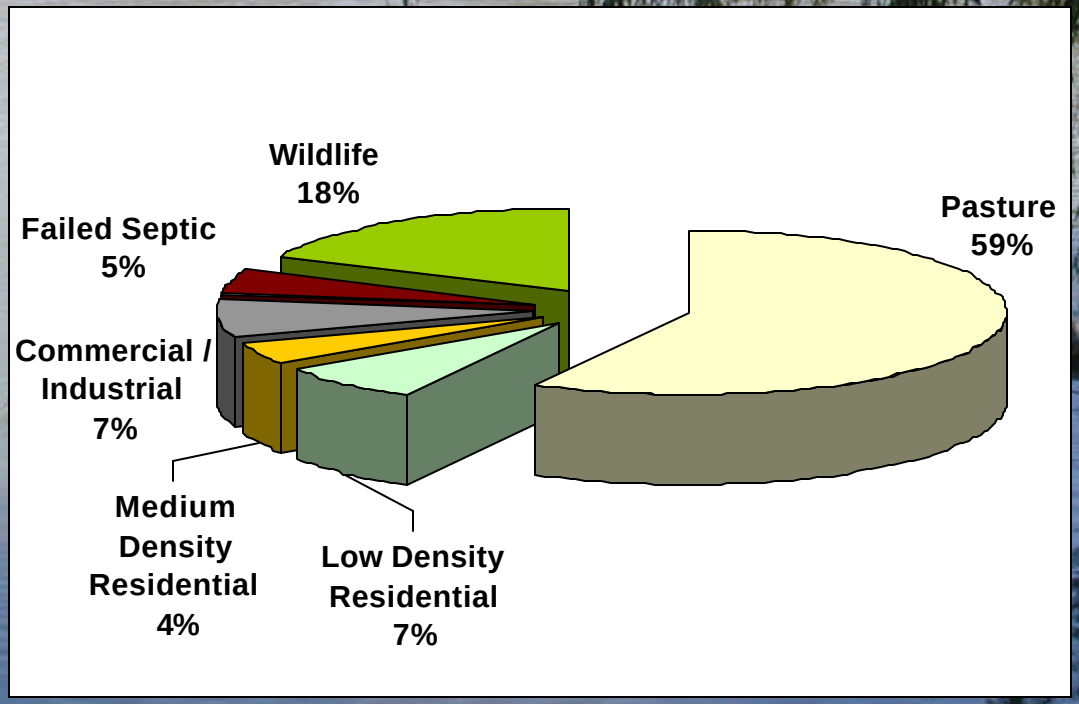
Existing Load



Bacteria Source	Percent Reduction
Forest	0%
Urban	96%
Agriculture	96%
Failed Septic	100%
Wildlife	64%
Cattle	100%
Point Source	0%

South Mayo River (Spoon Cr. mouth to NC line)

Existing Load



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North Fork Mayo River VAW-L46R-01	100%	100%	89%	0%
Smith River VAW-L53R-01	100%	100%	96%	64%
Smith River VAW-L54R-01	100%	100%	96%	64%
South Fork Mayo River VAW-L45R-01	100%	100%	97.9%	0%

Next Steps

- **Implementation Plan Development**

  Identify conservation measures to fix the problem. Conservation measures are often called Best Management Practices or BMPs.

- **Implementation**

  Ex. Agricultural and Urban BMPs, septic repair

- **Monitoring**

  Determine whether or not water quality is improving

Local TMDL Contacts

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Reports/presentations available at:
www.deq.virginia.gov/tmdl/mtgppt.html

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